

## **DISTRIBUTION, HABITAT USE AND BEHAVIOUR OF BOTTLENOSE DOLPHINS AT LAMPEDUSA ISLAND (ITALY): RESULTS OF FIVE YEARS OF SURVEY.**

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### **INTRODUCTION**

Since 1996, a population study has been conducted in Lampedusa Island (Mediterranean Sea, Italy), whose objectives were: a) assess the eventual degree of recidency of bottlenose dolphins (*Tursiops truncatus*) in the island; b) estimate the population size; c) study habitat use and d) examine the dolphins' behaviour.

### **METHODS**

Land and boat-based surveys, and photo-identification technique were used to derive the population estimate and to examine distribution and movements of individuals over a three-months summer period (July-September each year, from 1996 to 2000). Land-based observations lasting three hours were made from the two island's higher places (Albero Sole, NW and Capo Grecale, NE) at fixed times, both during the morning (07:00-10:00) and during the afternoon (17:00-20:00).

Dolphins number, position, estimate behaviour and direction of movement were recorded onto data sheets. Using a 4,5 inflatable powered outboard, boat-based surveys were made, trying to cover all the 4 zones we divided the area around the island within 6 miles from the coast. However, the northern part was rarely accessible due to the bad sea conditions.

35 mm cameras equipped with 35-80 mm, 70-210 mm and 60-300 mm lens were utilised for photo-identification purposes.

Focal group and *ad libitum* sampling methods (Altmann, 1974; Mann, 1999) were applied to assess the dolphins' behavioural activity, using both a videocamera and a tape voice recorder. The behavioural categories considered were: TRAVELLING, FEEDING, FEEDING IN ASSOCIATION WITH TRAWLERS, SEARCHING, SOCIALIZING, PLAYING, MILLING, RESTING, AND MIXED BEHAVIOURS (Shane, 1990; Pace *et al.*, 1998).

Data were analysed by mixed-model factorial ANOVA and principal component analysis (PCA).

### **RESULTS AND DISCUSSION**

A total number of 281 sightings (188 boat-based and 53 land-based) were recorded during the study (see Fig. 1 for details). Bottlenose dolphins have been documented in all parts of the study area, with some places of concentrated sightings. In particular, due to the presence of a submerged fish farm at Cala Calandra, the zone 1 holds about 30% of the total sightings since the animals were always seen in association with this structure. Zones 2 and 3, placed in the southern part of the island, reaches 27% and 28% respectively, while zone 4 covers the lasting 15% of sightings.

Group size ranged from singletons to 16 individuals (mean=3,8; s.d.=2,2; mode=1). A number of 140 recognizable individuals were catalogued and many of these identified dolphins (n=85, corresponding to 60% of the total) were resighted over the five-year study period, indicating a high degree of residency of the population (Fig. 2). However, the number of animals (n=55) solely identified on single occasions may demonstrate that Lampedusa's waters could only represent part of the home range for many members of the population possibly distributed in the entire Pelagie's Archipelago, even if the movements of the animals beyond the three islands of the Archipelago are as yet unknown.

The recruitment of individuals to the photoidentification catalogue decreased throughout the study (Fig. 3). However, the continuing adding up at the end of the study shows that unknown animals were still being encountered, suggesting a larger population than the photo-id catalogue.

Total age class composition of the group was: 883 adults (82%), 139 juveniles (13%) and 55 newborns (5%). A peculiar distribution of sightings as well as a difference between each year of study related to the presence of newborns was seen. In fact, two-ways ANOVA reveals that mother-calf pairs prefer zone 4 ( $F=2,98$ ;  $df=3$ ;  $p=0,04$ ) and that years 1998 and 2000 were higher than the others for the mean number of newborns observed ( $F=4,25$ ;  $df=4$ ;  $p=0,01$ ). The preference of the zone 4, particularly near to Albero Sole, was probably due to the fact that this area is relatively calm in terms of boat traffic and people disturbance, allowing mother-calf pairs to remain in a more safer environment.

To explore the relationship among behavioural categories and animals' age, principal component analysis (PCA) was conducted (60% of the total variance). Based on PCA pattern (Fig. 4), the category related to SOCIAL behaviour appeared the only one mainly associated with juvenile and newborn individuals. Furthermore, SOCIAL behaviour was found to be significantly associated with zone 3 ( $F=3,8$ ;  $df=3$ ;  $p=0,04$ ), considering that in this area more numerous and structured groups were observed. Other relationships between the different zones and behavioural categories were revealed by observation. In fact, RESTING was found essentially in zone 1, while FEEDING IN ASSOCIATION WITH TRAWLERS in zone 2.

## CONCLUSIONS

These results suggested:

- ◆ the presence of a resident population of *Tursiops truncatus* at Lampedusa island consisting of about 85 individuals
- ◆ the existence of a different habitat use in relation with behavioural categories and mother-calf pairs

While this study has provided a baseline data set relating to the Lampedusa island population, it is important to maintain a scientific monitoring of bottlenose dolphins in the area in order to cumulate significant information to be used for conservation management of the species in other coastal zones in Italy.

## Acknowledgment

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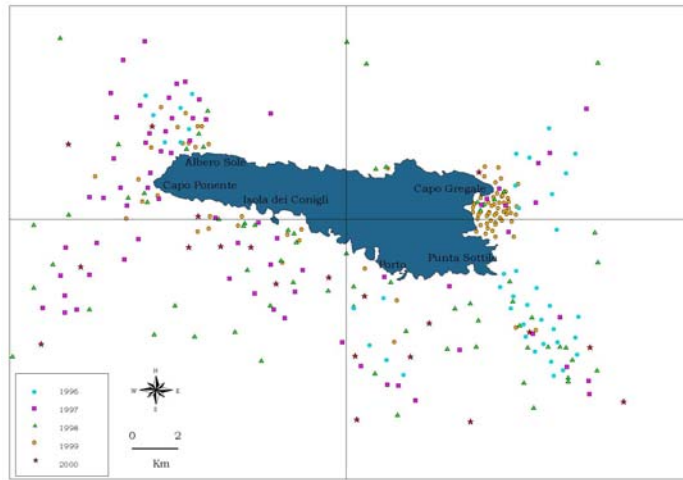


Figure 1

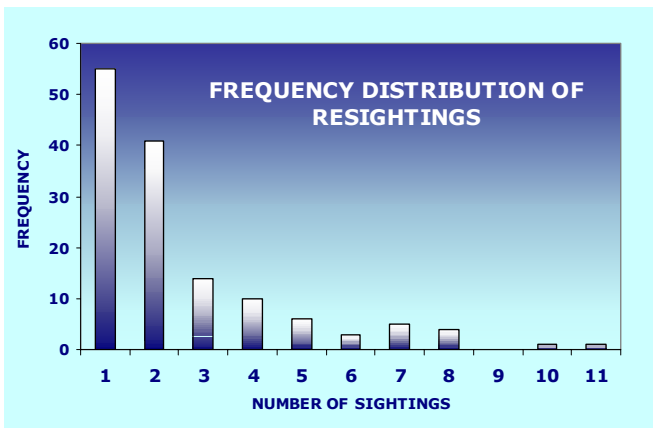


Figure 2

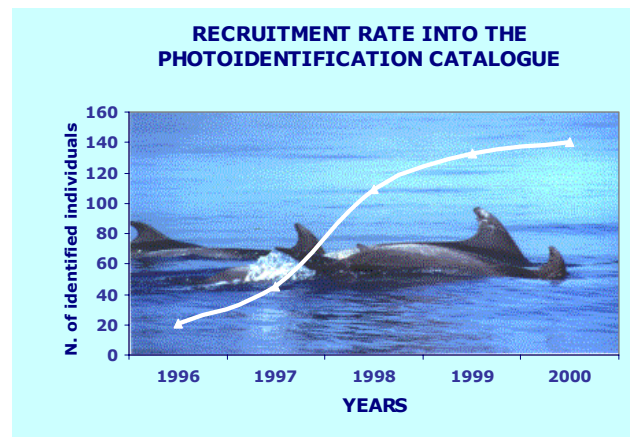


Figure 3

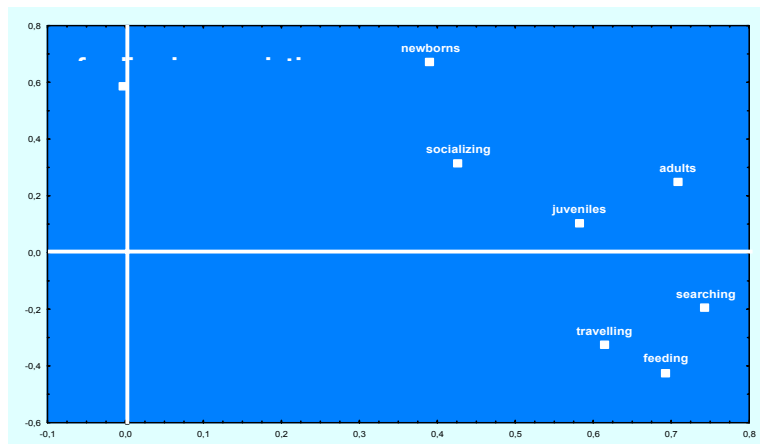


Figure 4